



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/612,241	07/01/2003	James Lovette	COOL-01400	3319
7590	10/18/2005		EXAMINER	
Thomas B. Haverstock HAVERSTOCK & OWENS LLP 162 North Wolfe Road Sunnyvale, CA 94086			DUONG, THO V	
			ART UNIT	PAPER NUMBER
			3753	

DATE MAILED: 10/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>
	10/612,241	LOVETTE ET AL.
	<b>Examiner</b>	<b>Art Unit</b>
	Tho v. Duong	3743

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 08 July 2005.
- 2a) This action is FINAL.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-81 is/are pending in the application.
- 4a) Of the above claim(s) 4,25,26,31,32,38,54,55,60,61 and 66-81 is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-3,5-20,27-30,33-37,39-49,56-59 and 62-65 is/are rejected.
- 7) Claim(s) 21-24 and 50-53 is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All    b) Some \* c) None of:
  1. Certified copies of the priority documents have been received.
  2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

1) <input type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413)
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date: _____
3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>10/3/05, 8/8/05</u> .	5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)
	6) <input type="checkbox"/> Other: _____

Continue from Attachment(s) box 3: 8/1/05 and 5/2/05

## **DETAILED ACTION**

Receipt of applicant's amendment filed 7/8/2005 is acknowledged. Claims 1-81 are pending. Claims 4,25-26,31-32,38,54-55,60-61 and 66-81 remain withdrawn from further consideration.

### ***Response to Arguments***

Applicant's arguments filed 7/8/2005 have been fully considered but they are not persuasive. Applicant's argument that both references to Galyon and Meyerhoff fail to disclose stacked routes, has been very carefully considered but is not deemed to be persuasive. Regarding to reference Galyon, Galyon discloses (figures 9) that a plurality of routes, which each route being formed by passages (901) and (902), are stacked together on an interface layer. The term "stack" is defined as "a large quantity or number" or "pile" which means to collect little by little into a mass (Merriam Webster's Collegiate Dictionary 10<sup>th</sup> Edition). Regarding to reference Mayerhoff, Mayerhoff discloses (figure 10) that a plurality of routes (210), which are stacked together or piled into a bunch in a middle portion of the interface layer (206).

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 5-6,8,20,27,29,30,35-37,39-40,42,49,56 and 59 are rejected under 35 U.S.C. 102(b) as being anticipated by Galyon et al. (US 5,016,090). Galyon discloses (figures 8, 9 and column 7, lines 37-45) a heat exchanger comprising a manifold layer (802) having a first

plurality of openings (808) for providing a cooling material to the heat exchanger and a second plurality of openings (809,810) for removing the cooling material from the heat exchanger; an interface layer (800,906) coupled to the manifold layer, the interface layer having a plurality of routes, which each route being formed by a passages (901) and (902), being stacked together on the interface layer; each route extends from one of the first plurality of openings and terminates at a corresponding one of the second plurality of openings, the routes for carrying the cooling material. Galyon further discloses (figure 9) a cross-section of the plurality of routes substantially contained in a plane non-parallel to a heat exchanging plane (bottom of 903) wherein a chip coupled to the bottom surface of the interface layer and the thermal interface layer comprises a copper or any other good heat conducting material.

Claims 1-3,5-6,8,15-19,20,27,29,30,34-37,39,40,42,49,56,59 and 62 are rejected under 35 U.S.C. 102(b) as being anticipated by A. Meyerhoff et al. (US 3,361,195). Meyerhoff discloses (figures 6-12) a heat exchanger comprising a manifold layer (208) having a first plurality of openings (218) for providing a cooling material to the heat exchanger and a second plurality of openings (214) for removing the cooling material from the heat exchanger; an interface layer (206) coupled to the manifold layer, the interface layer having a plurality of adjacent routes (210), which stacked or piled into a bunch in a middle portion of the interface layer, that extends from one of the first plurality of openings and terminates at a corresponding one of the second plurality of openings, the plurality of routes each substantially contained in a plane non-parallel to a heat exchanging plane (bottom of 903) wherein a semiconductor (204) coupled to the bottom surface of the interface layer and the thermal interface layer comprises metal or any base alloy thereof. Meyerhoff further discloses (column 6, lines 45-47) that the

manifold layer and the interface layer may be form a monolithic device. Meyerhoff further discloses (column 1) that air or gas was also known to use as a cooling fluid and vapor is a form of evaporated liquid such as water being sufficiently heated by the semiconductor (204) to become vapor.

*Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 7,9-14,41 and 43-48 are rejected under 35 U.S.C. 103(a) as obvious over Meyerhoff. Meyerhoff substantially disclose all of applicant's claimed invention as discussed above except for the suitable material of the thermal interface layer. It would have been obvious to one having ordinary skill in the art at the time the invention was made to choose the suitable material as claimed for the thermal interface layer, since it has been held to be within the general skill of a worker in the art to select known material on the basis of its suitability for the intended use as a matter on obvious design choice. In re Leshin, 125 USPQ 416. Furthermore, applicant does not disclose any criticality or unexpected result for selecting the claimed material. Moreover, it appears that the interface layer would perform equally well with any conductive material. Accordingly, the use of material is deemed to be a design consideration which fails to patentably distinguish over the prior art of Meyerhoff.

Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Meyerhoff in view of Messina (US 5,309,319). Meyerhoff substantially discloses all of applicant's claimed invention as discussed above except for the limitation that a pump is provided in the inlet opening. Messina discloses (figure 1 and column 4, lines 60-68) a fluid cooling system that has a pump (50) connected to an inlet opening (100) for the purpose of pumping the coolant into the cooling system. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use Messina's teaching in Meyerhoff's device for the purpose of pumping the coolant into the cooling system.

Claim 64 is rejected under 35 U.S.C. 103(a) as being unpatentable over Meyerhoff in view of Mathews (US 5,274,920). Meyerhoff substantially discloses all of applicant's claimed invention as discussed above except for the limitation that the plate with flow channels are formed by stamping. Mathews discloses (figures 1-4, column 2, lines 25-28 and column 5, lines 42-47) that stamping process has been used in forming flow channels on face of a plate for the purpose of simplifying the manufacturing steps of the cooling system. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use Mathews's teaching in Meyerhoff's system for the purpose of simplifying the manufacturing steps of the cooling system.

Claim 65 is rejected under 35 U.S.C. 103(a) as being unpatentable over Meyerhoff in view of Wang (US 6,477,045 B1). Meyerhoff substantially discloses all of applicant's claimed invention as discussed above except for the limitation that the plate with flow channels is made of injection molding. Wang discloses (figure 3 and column 2, lines 36-56) that an injection molding process has been used to form a plate with flow channels for the purpose of forming a

metal thermal interface layer in a cooling system with a known process in the art. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use Wang's teaching in Meyerhoff's system for the purpose of forming a metal thermal interface layer with a known process in the art.

Claims 28,57,58 and 63 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meyerhoff in view of Bonde et al. (US 5,099,311) and Park et al. (US 6,492,200) or Tuzi et al. (US 3,771,219). Meyerhoff substantially discloses all of applicant's claimed invention as discussed above except for the limitation that a heat generating device is integrally formed at the bottom of the interface layer. Bonde discloses (figures 2 and 8) an integrated cooling system that has the interface layer (40), which is a silicon wafer, that an integrated circuit (120) and leads (122) are formed directly on the wafer for the purpose of enhancing the cooling of the integrated circuit chip since the thermal distance between the cooling channel and the integrated circuit chip is shorter than having both layers of the interface layer and the electronic substrate. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use Bonde's teaching in Meyerhoff's device for the purpose of enhancing the cooling of the integrated circuit chip since the thermal distance between the cooling channel and the integrated circuit chip is shorter than having both layers of the interface layer and the electronic substrate. Both Meyerhoff and Bonde do not disclose that the method of patterning and etching steps in forming the semiconductor device. However, patterning and etching steps are well known in the semiconductor manufacturing area. Attention is now directed to either Tuzi et al or Park et al. Both Tuzi and Park disclose a method for manufacturing a semiconductor device that comprises the steps of patterning a semiconductor device and etching the patterned

Art Unit: 3743

semiconductor device on a wafer for the purpose of providing a semiconductor device with simple process and low cost. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use either Tuzi or Park's teaching in the combination device of Meyerhoff and Bonde for the purpose of providing a semiconductor device with simple process and low cost.

*Allowable Subject Matter*

Claims 21-24 and 50-53 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

*Conclusion*

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tho v. Duong whose telephone number is 571-272-4793. The examiner can normally be reached on M-F (first Friday off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Henry Bennet can be reached on 571-272-4791. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Tho v Duong  
Primary Examiner  
Art Unit 3743

TD

October 14, 2005